Direct Assessment of Skills in EE449

The following 'Score Sheet' was developed for a direct assessment of skills 2.2, 2.3, 3.2, 6.1, 6.2, 6.4, and 7.5 in EE449. The gray box names the skill while the larger one lists (in *italic*) actions or behaviors consistent with expected skill development. Most of the actions listed are not specific to a particular project or circuit and should be observable in student-written reports (from provided pictures, schematics, calculations, scope captures, discussions, and references.)

How to Use:

- The instructor shares this score sheet with students at the beginning of the quarter.
- The instructor scores each student (or lab group) by assigning 1, 2, or 3, where:
  "1" = poor, does not meet expectation; **"2" = acceptable**, meets expectations; **"3" = exceptional**
- The instructor notes the deficiencies whenever '1' or weak '2' is assigned; instructor-written comments are extremely valuable because they enable meaningful corrective actions.

Qtr: Section: Instructor Name: Student Initials:	Score
2.2 Able to specify, select and design components and systems from the sub-disciplines of electrical engineering	
○ *Selects topologies (from the literature) and modifies component values to meet performance goals.* ○ *Applying engineering judgment selects appropriate in value components (not too small or large - Goldilocks' principle of moderation)* ○ *Specifies ratings and tolerances of components used; justifies selections.* ○ *Interfaces circuits and sub-systems properly (DC off-setting, AC blocking, pull-up resistors, etc.)* ○ *Implements algorithms (on digital processors) that have a low probability for grave errors (numeric overflow etc.);* ○ *When coding, selects unambiguous names for variables and functions and includes adequate comments.*	
Comment:	
2.3 Able to build and troubleshoot a functional prototype and verify if it meets performance specifications	
○ *Provides easy access to key test points.* ○ *Minimizes interference among subsystems (proper grounding, supply bypass, signal routing, etc.).* ○ *Correctly terminates all unused components of an IC (inputs and outputs of logic gates, op-amps, potentiometer, other)* ○ *Using FFT (on digital oscilloscopes) verifies LTI assumptions and studies noise and interference in the freq. domain.* ○ *Explores and resolves noise and interference issues (including that 'seen' at the supply terminals of individual devices).*	
Comment:	
3.2 Proficient writing technical reports	
○ *Provides enough technical details for a reader to replicate the work (values, part #, equipment used, test conditions, etc.)* ○ *When discussing design, addresses both 'how' and 'why'.* ○ *No colloquial language, unidentified acronyms, missing or incorrect units.* ○ *Links all figures, tables, and equations to text.* ○ *Identifies and references all sources appropriately.*	
Comment:	

Qtr: Section: Instructor Name: Student Initials: Score

6.1 Proficient with the function and operation of test and measurement instrumentation

- *Estimates DUT current consumption and sets the current limit of the power supply to ensure safe testing conditions.*
- *Uses a multimeter to verify component values and DC operating points.*
- *When studying waveforms with an oscilloscope, selects appropriate horizontal scale, vertical scale, triggering and coupling schemes; when appropriate uses external triggering.*
- *Demonstrates awareness of the oscilloscope technical limitations and their impact upon measured quantities (limitations such as finite probe impedance, channel bandwidth, channel gain precision, etc.)*

Comment:

6.2 Able to design and implement functionality, performance, or parameter measurement test and verification plan

- *Performs test and verification at a component, sub-system, and system level.*
- *Conceives and implements worst-case analysis and test.*
- *Specifies performance tests consistent with the intended operating conditions (signal strength, bandwidth, loading, etc.)*

Comment:

6.4 Able to estimate and quantify parameters for a model, given experimental data

- *Defines circuit bandwidth and/or quality factor from a measured magnitude and/or phase responses (amplifier or filter).*
- *Creates an RLC model of a sensor (ultrasonic transducer, crystal, photo-diode, other)*
- *Uses Microsoft excel solver or an alternative tool to tune the parameters of a model.*

Comment:

7.5 Able to read and extract information from a datasheet, schematic or other technical documents.

- *Estimates the worst-case current, power, and energy consumption of system from the datasheets of the devices used in the implementation.*
- *Uses appropriate in value by-pass, filtering, and /or compensation capacitors as dictated by the manufacturer specifications (for timers, linear and switching regulators, op-amps, data converters, other)*
- *Determines GBW, slew rate, voltage compliance and other limitations of op-amps and uses the values to inform design decisions.*

Comment: